COMPARING THE EFFECTIVENESS OF MAITLAND MOBILIZATION TECHNIQUE AND MUSCLE ENERGY TECHNIQUE ON PAIN, RANGE OF MOTION AND FUNCTIONAL ACTIVITIES IN ADHESIVE CAPSULITIS

Dissertation submitted in

Partial fulfillment

for the degree of

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(ORTHOPAEDICS)

The Tamil Nadu Dr. M.G.R. Medical University

Chennai

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PSG COLLEGE OF PHYSIOTHERAPY

Coimbatore

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CERTIFICATE

This is to certify that the research work entitled **"COMPARING THE EFFECTIVENESS OF MAITLAND MOBILIZATION TECHNIQUE AND MUSCLE ENERGY TECHNIQUE ON PAIN, RANGE OF MOTION AND FUNCTIONAL ACTIVITIES IN ADHESIVE CAPSULITIS"** was carried out by **Reg. No. 271610245,** P.S.G. College of Physiotherapy, towards the partial fulfillment for the degree of MASTER **OF PHYSIOTHERAPY (Physiotherapy in Orthopaedics)** affiliated to The Tamilnadu Dr. M.G.R. Medical University, Chennai.

Internal Examiner **External Examiner**

Date of Evaluation:

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DEDICATED TO MY EVERLOVING PARENTS AND MY DEAR BROTHERS

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ABBREVIATIONS

MMT	-	MAITLAND MOBILIZATION TECHNIQUE
MET	-	MUSCLE ENERGY TECHNIQUE
NPRS	-	NUMERICAL PAIN RATING SCALE
ROM	-	RANGE OF MOTION
SPADI	-	SHOULDER PAIN AND DISABILITY INDEX

CONTENTS

LIST OF ANNEXURES

Annexure	Content
I	Ethical Committee Approval Letter
II	Assessment form
III	Assessment Tool (NPRS and SPADI)
IV	Informed Consent (English and Tamil)
V	Treatment Protocol & Home exercise (English and Tamil)

CHAPTER I

INTRODUCTION

1.1. BACK GROUND OF THE STUDY

ADHESIVE CAPSULITIS:

The term adhesive capsulitis is a well-defined shoulder disorder characterized by progressive pain and stiffness of shoulder which resolves after 18 months period the cause remain unknown which is due to fibroblastic proliferation in the rotator interval anterior capsule and coaraco-humeral ligament [(4)].

The annual incidence of adhesive capsulitis in the general population in approximately 3 to 5% and upto 20% in people with diabetes. It is most frequently found in patients between the fourth and sixth decades of life and it is more common in women the men [(28)].

Duplay in 1896 first described about this condition and named asperiarthritis scapula humeraleidentifying as the lesion of periarticular structures [(23)].

Nevasier coined the term adhesive capsulitis to describe a contracted thickened joint capsule that seemed to be drawn tightly around the humeral head with a relative absence of synovial fluid and chronic inflammatory changes with the synovial layer of the capsule[(3)].

The movements will be restricted in all planes without any radiological abnormalities and both active and passive movements will be painful and restricted with external rotation and abduction limited to the maximum[(23)].

ETIOLOGY:

The Etiology remains unclear, adhesive capsulitis can be classified as primary or secondary. Frozen shoulder is considered primary if the onset is idiopathic while secondary results from a known causes or surgical event. Three subcategories of secondary frozen shoulder include systemic –Diabetes mellitus and other metabolic conditions.

Extrinsic – cardiopulmonary disease, cervical disc, Cerebrovascular accident, humerus fractures, Parkinson's disease. Intrinsic factors rotator cuff pathologies, biceps tendonitis, calcific tendonitis, Acromioclavicular joint, arthritis [29].

PATHOLOGY:

The disease process affects the anteriosuperior joint capsule, maxillary recess, and the coracohumeral ligament. It has been show through arthroscopy that patient tend to have a small joint with loss of the axillary fold, tight anterior capsule and mild or moderated synovitis but no actual adhesions. Contracture of the rotator cuff interval has also been seen in adhesive capsulitis patients, and greatly contributes to the decreased range of motion seen in this population.

There is continued disagreement about whether the underlying pathology is an inflammatory condition, fibrosing condition, or an algoneurodystrophic process, evidence suggests there is synovial inflammation followed by capsular fibrosis, in which type I and III collagen is laid down with subsequent tissue contraction. Elevated levels of serum cytokines have been noted and facilitate tissue repair and remodelling during inflammatory processes. In primary and some secondary cases of adhesive capsulitis cytokines have shown to be involved in the cellular mechanism that leads to sustained inflammation and fibrosis. It is proposed that there is an imbalance between aggressive fibrosis and a loss of normal collagenous remodelling, which can lead to stiffening of the capsule and ligamentous structures [29].

CONSISTS OF THREE PHASES:

Painful Phase:

Gradual onset of shoulder pain at rest with sharp pain at extremes of motion and pain at night with sleep interruption which may last anywhere from 3-9 months.

Stiffening Phase:

Pain starts to subside, progressive loss of glenohumeral motion in capsular pattern, pain is apparent only at extremes of movement. This phase may occur at around 4 months and last till about 12 months.

Thawing Phase:

Spontaneous, progressive improvement in functional range of motion which can last anywhere from 1 to 3.5 years [29].

In phase II, the contracted capsule does not allow normal free movement of the shoulder which causes the scapula to move excessively in upward rotation and lateral trunk lean to compensate for the loss on glenohumeral rotation[3].

The capsular pattern of restricted range of shoulder motion in adhesive capsulitis is external rotation, abduction and internal rotation. In adhesive capsulitis of shoulder, there will be proportional limitation in all movements of the glenohumeral joint in all planes [7].

Pain, active movements (External rotation, abduction, internal rotation and flexion) and functional outcomes were used as primary outcome measures because they are important features in adhesive capsulitis of shoulder.

Physiotherapy intervention usually used for the management of this specific condition are heat or cold modalities. Active exercise, Maitland Mobilization Techniques and Muscle Energy Techniques. Maitland Mobilization Techniques and Muscle Energy Techniques is an important part of intervention which includes the normal physiological movement and the accessory movement.

MAITLAND MOBILIZATION TECHNIQUES:

Mobilization are passive, skilled manual therapy techniques applied to joint and related soft tissues at varying speeds and amplitudes using physiologic or accessory motions, for therapeutic purpose[5].

MAITLAND MOBILIZATION FIVE GRADE:

Grade 1:

Small amplitude rhythmic oscillations are performed at the beginning of range.

Grade 2:

Large amplitude rhythmic oscillations are performed within the range. Not reaching the limit.

Grade 3:

Large amplitude rhythmic oscillations are performed at the limit of available motion and stressed into tissue resistance.

Grade 4:

Small amplitude rhythmic oscillations are performed at the end range of motion.

Grade 5:

High velocity thrust technique is performed to snap adhesions at the limit of available motion.

Usually grades 1 and 2 are used to relax and reduces the pain and spasm.

Grade 3 and grade 4 are used to joint stiffness and the stretching maneuvers [15].

MUSCLE ENERGY TECHNIQUES:

Muscle Energy Techniques (MET) are a class of soft tissue osteopathic manipulation methods that incorporate precisely directed and controlled patient initiated, isometric contractions, designed to improve musculoskeletal function and reduce pain [25].

Muscle Energy Techniques is a manual therapy technique which uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition, and lengthen the muscle.

POST ISOMETRIC RELAXATION:

Post Isometric Relaxation is the effect of the decrease in muscle tone in a single or group of muscle. After a brief period of submaximal isometric contraction of the same muscle. Post Isometric Relaxation works on the concept of autogenic inhibition [30].

ANATOMY

GLENOHUMERAL JOINT

- The shoulder joint is a synovial joint of the ball and socket variety.
- Head of humerus is larger than the glenoid fossa.

ANGLES:

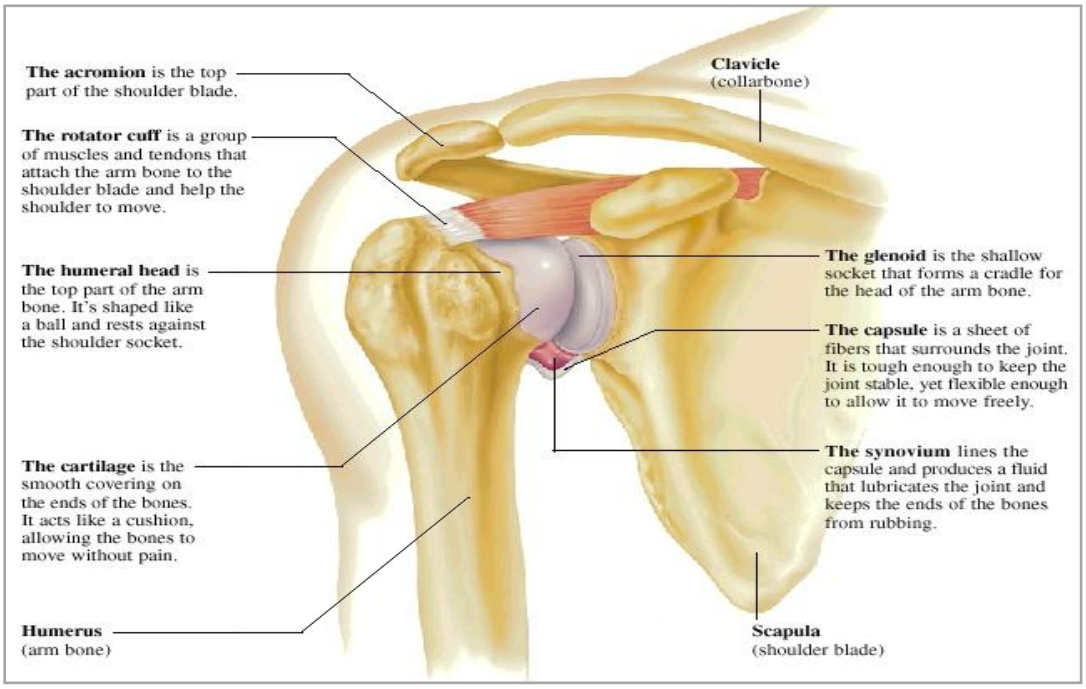
Humeral head and neck angles -130 to 150 degrees.

GLENOID LABRUM:

The glenoidlabrum consists of fibro cartilage and fibrous tissue. The rim of fibro cartilagenous tissue attaches around the margin of glenoid fossa. Inner surface of the labrum is covered with synovium and other surface attaches to the capsule.

CAPSULE:

Capsule is a loose fitting which surround the joint and allowing the joint surface to separate 2 to 3mm by a distractive force. It gives stability to the joint.

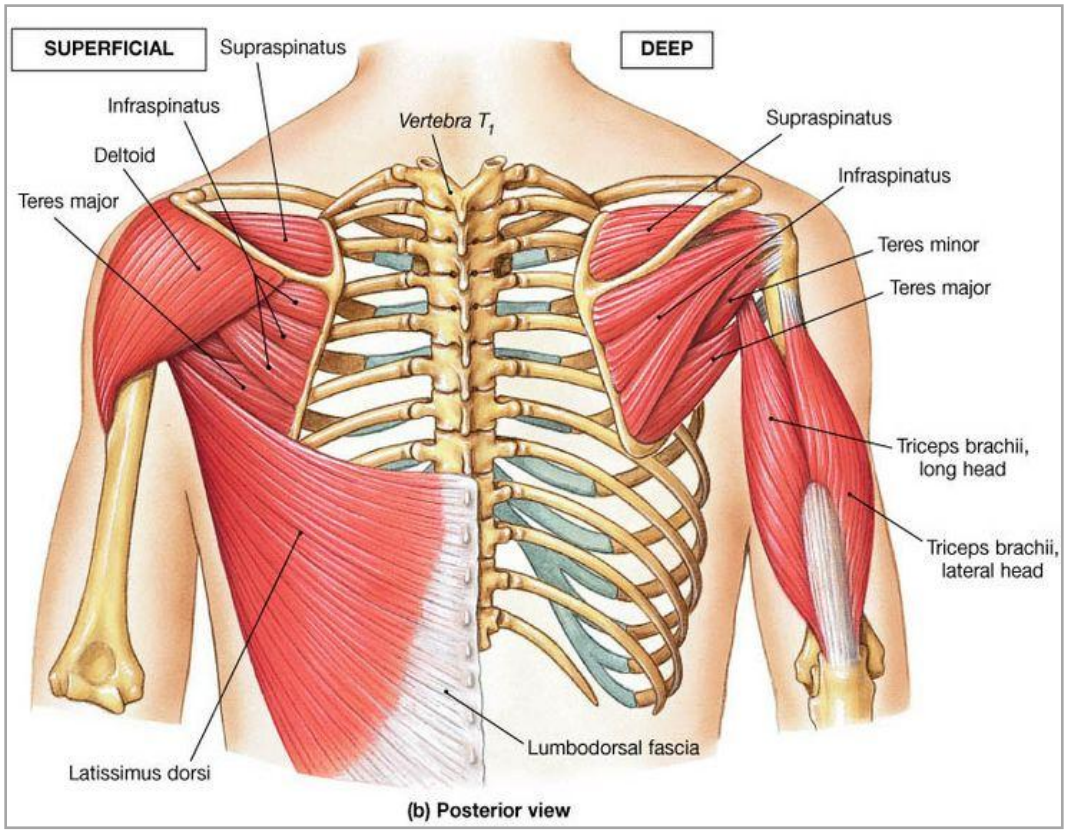


BLOOD SUPPLY:

- Anterior circumflex humeral vessels
- Posterior circumflex humeral vessels
- Suprascapular vessels
- Subscapular vessels

NERVE SUPPLY:

- Axillary nerve
- Musculocutaneous nerve
- Suprascapular nerve



SHOULDER MUSCLES:

SHOULDER FLEXION:

- Clavicular head of the pectoralis major
- Anterior fibres of deltoid

SHOULDER EXTENSION:

- Posterior fibres of deltoid
- Latissimusdorsi

SHOULDER ADDUCTION:

- Pectoralis major
- Latissimusdorsi
- Short head of biceps brachii
- Long head of triceps brachii

SHOULDER ABDUCTION:

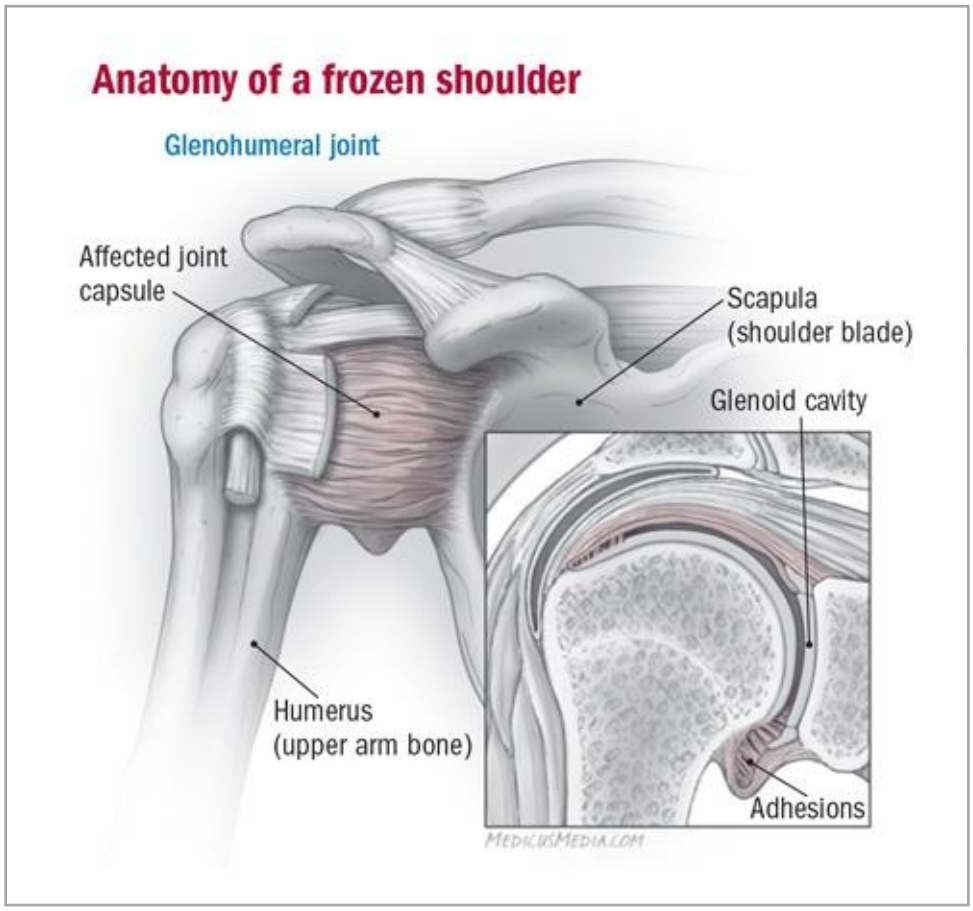
- Supraspinatus 0-15 degrees
- Deltoid 15-90 degrees
- Serratus anterior 90-180 degrees
- Upper and lower fibres of trapezius 90-180 degrees

MEDIAL ROTATION:

- Pectoralis major
- Anterior fibres of deltoid
- Latissimusdorsi
- Teres major

LATERAL ROTATION:

- Posterior fibres of deltoid
- Infraspinatus
- Teres minor



NORMAL RANGE OF MOTION:

- Flexion 0-180 Degrees
- Extension 0-45 Degrees
- Abduction 0-180 Degrees
- Adduction 180-0 Degrees
- External Rotation 0-70 Degrees
- Internal Rotation 0-90 Degrees

1.2. NEED OF THE STUDY:

Adhesive Capsulitis is a common painful syndrome which interferes with a patient's ability to participate in self-care and occupational activities.

Primary Adhesive Capsulitis affects 3-5% of the general population and is the main cause of shoulder pain and dysfunction. In individuals aged 40-65 years. Pain and Range of Motion impairments associated with primary Adhesive Capsulitis can be impact a patient's ability to participate in self-care and occupational activities.

Currently, physical therapists used for the management of this specific condition are heat and cold modalities, active exercises, PNF techniques.

Maitland Mobilization Technique and Muscle Energy Technique play important part of intervention in Adhesive Capsulitis of shoulder by reducing pain intensity, improving the accessory movements, thereby enhancing the functional activities of the shoulder in all planes. So there is a need to evaluate the effectiveness Maitland Mobilization Technique and Muscle Energy Technique in pain reduction, improvements in range of motion and functional outcomes of subjects with Adhesive Capsulitis of shoulder.

1.3. AIM OF THE STUDY:

The aim of the study was to find out the effects of Maitland Mobilization Technique and Muscle Energy Technique on pain, range of motion and functional activities in Adhesive Capsulitis.

1.4. OBJECTIVES OF THE STUDY:

- To find out the effects of Maitland Mobilization Technique on pain, range of motion and functional activities in subjects with Adhesive Capsulitis.
- To find out the effects of Muscle Energy Technique on pain, range of motion and functional activities in subjects with Adhesive Capsulitis.
- To compare the effects of Maitland Mobilization Technique and Muscle Energy Technique on pain, range of motion and functional activities in subjects with Adhesive Capsulitis.

1.5. HYPOTHESIS:

NULL HYPOTHESIS (Ho)

There will be no significant difference between the effects of Maitland Mobilization Technique and Muscle Energy Technique on pain, range of motion and functional activities in Adhesive Capsulitis.

ALTERNATIVE HYPOTHESIS (Ha)

There will be significant difference between the effects of Maitland Mobilization Technique and Muscle Energy Technique on pain, range of motion and functional activities in Adhesive Capsulitis.

1.6. OPERATIONAL DEFINITIONS:

ADHESIVE CAPSULITIS:

Adhesive Capsulitis is self-limiting condition of unknown etiology characterized by painful restriction of active and passive glenohumeral joint motion. **(NEVIASER 1983)**

PAIN:

An unpleasant sensory and emotional experience associated with actual or potential tissue damage. **(IASP – 2014)**

RANGE OF MOTION:

Range of motion the measurement of movement around a specific joint or body part. Anatomical position to extreme limited of the motion. **(ERIN MCLAUGHLIN)**

FUNCTIONAL ACTIVITIES:

Activities are required to perform the functional activities included working setting of daily living**.** **(NUGENT. PAM M.S -2013)**

MAITLAND MOBILIZATION TECHNIQUE:

It is a passive, skilled manual therapy technique applied to the joints and related soft tissues at varying speed and amplitudes using physiological or accessory motion for therapeutic purposes. **(D. MAITLAND 1991)**

MUSCLE ENERGY TECHNIQUE:

It is a voluntary muscle action can be influenced by Muscle Energy Technique used for lengthening and strengthening of muscles. **(DR. FRED MITCHELL 1950)**

CHAPTER II

LITERATURE REVIEW

Shah Atikaet. al., 2013 done a study on Adhesive Capsulitis with 30 subjects including both male and females aged between 40-60 years old. Study duration was 2 weeks. All subjects were measured for pain by VAS, for all shoulder movements by goniometer on first day before starting treatment and on 15th day after treatment. They conducted that an experimental study and confirmed that the MET is more effective in reducing pain of an acute or chronic nature, makes controlled contraction of involved muscles is difficult, the therapeutic use of antagonist by MET can patently be valve and as soon the pain subsides Maitland Mobilization can be Incorporated to increase ROM.

Abhay Kumar et.al., 2012 in their study on physical therapy treatment of shoulder. The study was conducted with 40 subjects including both male and female age between 40-60 years old. Study duration was 4 weeks. All subjects were measured for VAS and shoulder ROM (external rotation and abduction) and Shoulder Pain And Disability Index. They concluded that an experimental study and confirmed that the Maitland Mobilization technique with the combination of exercise had proved their efficacy in relieving pain and improving ROM and shoulder function hence should form a part of the treatment plan.

Narayan et.al., 2014 done a study on Adhesive Capsulitis with30 subjects including both male and female aged between 40-60 years old. Study duration was 5 weeks. All subjects were measured for Shoulder Pain And Disability Index scoring. Each group was divided into 15 patients, Group A Experimental and group b control. They concluded that an experimental study and found that MET is very much effective on functional ability of shoulder in Adhesive Capsulitis.

Pravin P Gawali et.al., 2016 in their study on physical therapy treatment Adhesive Capsulitis. The study was conducted with 30 subjects including both male and female age. Study duration was 5 days. All subjects were measured by VAS, ROM Shoulder Pain And Disability Index. They concluded that an experimental study was capsular stretching and Maitland Mobilization were effective among which Maitland Mobilization was significantly effective in

reducing pain on VAS and significantly effective in reducing in disability on SPADI. The study was result Maitland Mobilization was significantly effective in reducing pain on VAS; improving glenohumeral mobility and disability.

Mohan Kumar.G.et.al., 2016 done a study onAdhesive Capsulitis with 40 subjects including both male and female age between 40-60 years old. Study duration was 21days. All subjects were measured for VAS and Shoulder Pain And Disability Index. They concluded that an experimental study was MET coupled with ultrasound therapy imparts more effective solution than the mobilization technique coupled with ultrasound. Hence this study has demonstrated a better combination therapy regimen for the treatment PA shoulder the physiotherapists, similarly, potential of this combination therapy can be explored on types of ailments demanding physiotherapy.

Edrish Saifee Contractor.et.al., 2016 in their study on physical therapy treatment Adhesive Capsulitis. The study was conducted with male and female age between 40-65 years old. Study duration was 4 weeks 3 days. All subjects were measured for VAS and Shoulder Pain And Disability Index. They concluded that an experimental study the spencer MET is more effective increasing functional ability in patient with adhesive capsulitis as compared to conventional treatment.

Sonakshi Sehagal.et.al., 2016 done a study on Adhesive Capsulitis with 30 subjects aged between 16-30 years old. Study duration was 2 weeks.They concluded that an experimental study MET is an effective treatment for increasing the ROM and strength of internal rotation at the glenohumeral joint in asymptomatic overhead athletes. Therefore application of MET for the external rotators may be use full for increasing the ROM as well as strength in overhead althletes.

Breckenridge JD.et.,al 2011 the shoulder pain and disability index (SPADI) was developed to measure current SPADI reliability and validity scales.

Anwar Ali Gayasi.et.al., 2014 Most preferred manual therapy technique among physiotherapist for treating Frozen Shoulder. All the manual therapy techniques have their pool of research suggesting as effective in treating frozen shoulder but, it is seen that not all of them are for frozen shoulder. So, this survey was conducted in which 120 questionnaries were distributed among physiotherapists of pune fulfilling the inclusion criterion to know their preferred manual therapy technique for treating frozen shoulder. 100 physiotherapists responded, their responses were documented and calculated.

Henricus M Vermeulem.et.al., 2006 the in their study on physical therapy treatment of shoulder. The study was conductedwith 100 subjects including both male and females age between 40-60 years old. Study duration was 12 weeks (24 session). Subjects randomly assigned to the HGMT group were treated with intensive passive mobilization technique in end-range positions of GH joint, and subjects in the LGMT group were treated with passive mobilization techniques within the pain-free zone,all subjects were measured for shoulder rating questionnaire (SRO) and Shoulder disability questionnaire (SDQ). An analysis of covariance with adjustments for baseline values and a general linear mixed- effect model for repeated measurements were used to compare the change scores for the 2 treatment groups at the various time points and over the total period of 1 year. In subjects with adhesive capsulitis of the shoulder, HGMTs appear to be more effective in improving GH joint mobility and reducing disability than LGMTs, with the overall differences between the 2 interventions being small.

Joshua Cleland.et.al., 2002 in their study on systematic review- non-operative experimental or descriptive research- based outcomes studies of physical therapy. Systematic reviews suggest that many patients treated with physical therapy benefited from reduced symptoms, increased mobility, and functional improvement.

Zaki Anwer.et.al., 2017 done a study on Adhesive Capsulitis with 30 subjects including both male and females age between 40-50 years old. Study duration was 6 weeks. All subjects were measured for pain by VAS,for all shoulder movements by goniometer and functional activities measured by SPADI. In study there are improvements in all shoulder parameters after treatment and in the follow up period compared to before treatment in both group through both treatment are effective in reducing the symptoms associated with adhesive capsulitis.

CHAPTER III

METHODOLOGY

3.1. STUDY DESIGN

A Prospective, open labelled, quasi-experimental comparative design

3.2. STUDY SETTING

Department of Orthopaedics& Department of Physical Medicine and Rebhabilitation, PSG Hospitals, Coimbatore.

3.3. SAMPLING METHOD

Simple random sampling method

3.4. SELECTION CRITERIA

Inclusion Criteria

- The age group of 40-65 years
- Both male and female
- Apley's scratch test positive
- Painful phase and stiffening phase included in adhesive capsulitis
- Who will consent to participate in the study

Exclusion Criteria

- Shoulder dislocation
- Upper limb neurological deficit
- Any trauma to the joint structure and soft tissue particular shoulder
- Thoracic outlet syndrome
- Manipulation under anaesthesia
- Any pathology neck pain
- Received physiotherapy for the same problem till 3 months
- Myocardial infarction
- Red flags to mobilization

3.5. STUDY DURATION

The period of study was 7 months

3.6. STUDY MATERIALS

- Assessment chart
- Goniometer (universal)
- Inch tape
- Knee hammer
- Hot pack
- Wand
- Treatment couch, Bed sheet, Pillows and towel, Pen, Timer

3.7. TREATMENT DURATION

2 Sets 10 Repetitions, 3 session/ week for 2 weeks

3.8. OUTCOMES MEASURES

- shoulder Range of motion (goniometer)
- Numerical pain rating scale (NPRS)
- Shoulder Pain And Disability Index (SPADI)

3.9. PARTICIPANTS

34 Subjects with Adhesive Capsulitis were recruited from the Orthopaedic department and PMR department. 28 Subjects accepted to inclusion criteria and were randomly allocated into 2 groups by simple random sampling method.

3.10. INTERVENTION

- **GROUP A- 14 Subjects – Received Maitland Mobilization Technique**
- **GROUP B- 14 Subjects – Received Muscle Energy Technique**

CHAPTER-IV

STATISTICAL ANALYSIS AND INTERPRETATION

The Mean, Standard deviation and Paired-t- test, Independent-t- test values were used to find out any significant difference between the two groups. (Group A and B)

Data collected from Group A (Maitland Mobilization Technique) and Group B (Muscle Energy Technique) were analyzed by using paired t- test to measure the changes between the pre and post-test values within the group and independent –t test was done to measure the changes between group analysis. All these statistical analysis were performed through SPSS-20 Version.

Paired 't' test :

$$SD = \sqrt{\frac{\sum (d - \overline{d})^2}{n-1}}$$

$$t = \frac{\overline{d}\sqrt{n}}{SD}$$

$\overline{d}$ = Calculated Mean Difference of pretest and posttest values

SD = Standard Deviation

n = Number of samples

d = Difference between pretest and posttest values

Independent 't' test :

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{SD\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,

$$SD = \sqrt{\frac{(n_1 - 1)SD_1^2 + (n_2 - 1)SD_2^2}{(n_1 + n_2) - 2}}$$

$\overline{X_1}$ = Mean difference in Group A

$\overline{X_2}$ = Mean difference in Group B

SD = Combined standard deviation of Group A and Group B

n_1 = Number of patients in Group A

n_2 = Number of patients in Group B

SD_1 = Standard Deviation of Group A

SD_2 = Standard Deviation of Group B

TABLE: 1

MAITLAND MOBILIZATION TECHNIQUE DATA VALUES

P. NO	MAITLAND MOBILIZATION TECHNIQUE GROUP A							
	PAIN		RANGE OF MOTION (Degree)				SPADI (%)	
			ABDUCTION		EXT.ROT			
	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1	9	1	150	175	60	75	35	4
2	9	1	70	175	25	80	82	15
3	8	2	90	150	35	45	69	14
4	7	2	150	170	35	45	53	12
5	6	2	150	175	40	60	53	11
6	7	3	100	145	30	40	71	19
7	6	1	100	170	40	55	50	5
8	8	2	100	155	45	50	77	18
9	7	0	100	175	45	60	62	2
10	6	1	120	175	45	55	59	5
11	7	1	110	175	30	70	55	12
12	8	0	140	180	35	60	62	0
13	7	2	110	165	35	55	67	20
14	9	1	120	170	35	55	78	15

TABLE: 2

MAITLAND MOBILIZATION TECHNIQUE

PRE AND POST VALUES OF PAIN

(GROUP A)

OUTCOME	ANALYSIS	Mean	Mean difference	Standard Deviation	t value	p value
PAIN	PRE	7.428	6.071	1.491	5.229	0.001
	POST	1.357				

TABLE: 3

MAITLAND MOBILIZATION TECHNIQUE

PRE AND POST VALUES OF RANGE OF MOTION

(GROUP A)

OUTCOME RANGE OF MOTION	ANALYSIS	Mean	Mean difference	Standard Deviation	t value	p value
SHOULDER ABDUCTION	PRE	115	53.21	22.498	8.850	0.001
	POST	168.21				
SHOULDER EXTERNAL ROTATION	PRE	33.214	19.285	13.424	5.375	0.001
	POST	57.50				

TABLE: 4

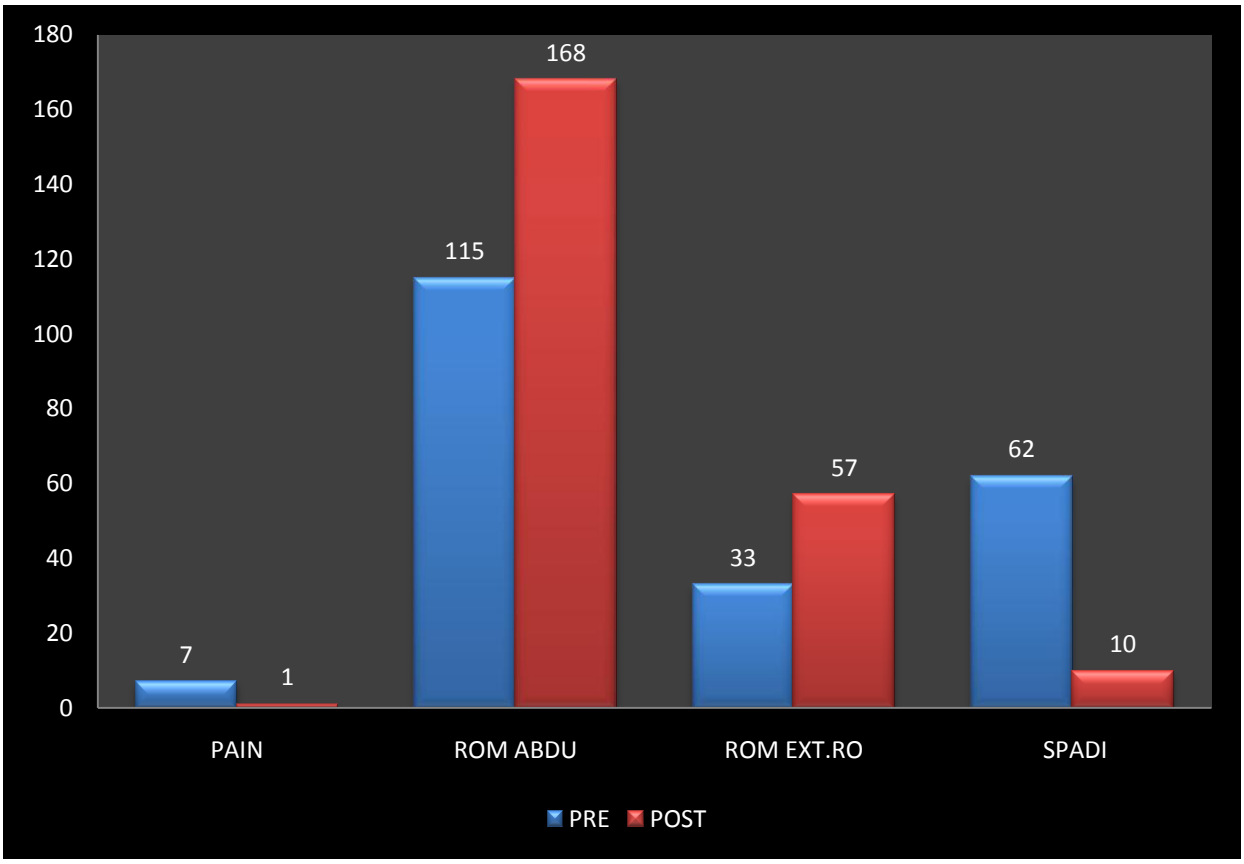
MAITLAND MOBILIZATION TECHNIQUE

PRE AND POST VALUES OF FUNCTIONAL ACTIVITIES

(GROUP A)

OUTCOME	ANALYSIS	Mean	Mean difference	Standard Deviation	t value	p value
Shoulder Pain And Disability Index (SPADI)	PRE	62.35	5.1500	10.323	18.666	0.001
	POST	10.85				

GRAPH: 1



Graphical Representation Maitland Mobilization Technique (Group A) Within Group Analysis on Pain, Range Of Motion and Functional Activities

TABLE: 5

MUSCLE ENERGY TECHNIQUE DATA VALUES

P. NO	MUSCLE ENERGY TECHNIQUE GROUP B							
	PAIN		RANGE OF MOTION (Degree)				SPADI (%)	
			ABDUCTION		EXT.ROT			
	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1	8	2	80	150	25	50	60	9
2	7	1	135	170	45	60	53	11
3	9	3	100	165	25	45	71	27
4	7	2	150	165	30	55	56	17
5	8	2	130	170	35	70	72	21
6	8	2	130	160	35	40	76	19
7	6	0	90	180	40	70	48	0
8	8	0	120	175	35	60	69	3
9	6	2	120	160	35	55	56	7
10	6	2	140	165	40	50	58	11
11	6	2	120	165	45	50	60	20
12	9	4	110	130	35	40	90	40
13	8	2	100	165	25	50	80	20
14	5	1	120	175	40	65	56	7

TABLE: 6

MUSCLE ENERGY TECHNIQUE

PRE AND POST VALUES OF PAIN

(GROUP B)

OUTCOME	ANALYSIS	Mean	Mean difference	Standard Deviation	t value	p value
PAIN	PRE	7.214	5.428	1.157	17.542	0.01
	POST	1.785				

TABLE: 7

MUSCLE ENERGY TECHNIQUE

PRE AND POST VALUES OF RANGE OF MOTION

(GROUP B)

OUTCOME RANGE OF MOTION	ANALYSIS	Mean	Mean difference	Standard Deviation	t value	p value
SHOULDER ABDUCTION	PRE	117.5	46.42	21.342	8.140	0.001
	POST	163.92				
SHOULDER EXTERNAL ROTATION	PRE	35	19.285	9.777	7.380	0.01
	POST	54.285				

TABLE: 8

MUSCLE ENERGY TECHNIQUE

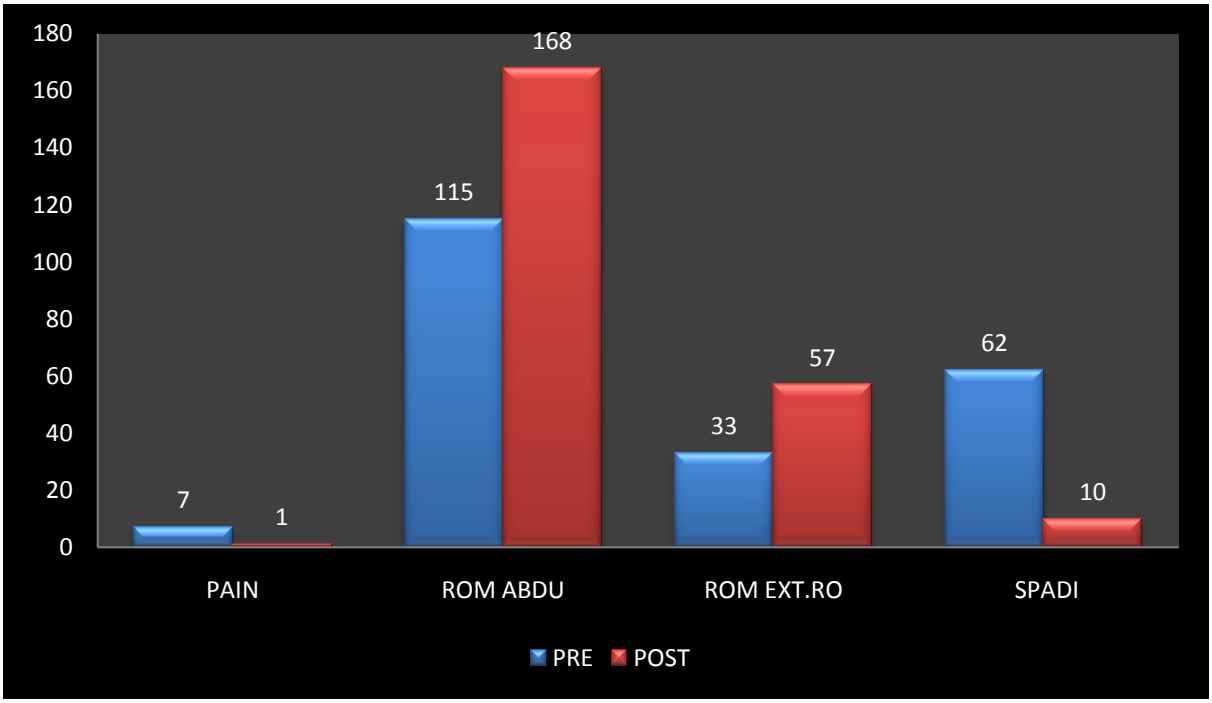
PRE AND POST VALUES OF FUNCTIONAL ACTIVITIES

(GROUP B)

OUTCOME	ANALYSIS	Mean	Mean Difference	Standard Deviation	t value	p value
Shoulder Pain And Disability Index (SPADI)	PRE	64.642	4.9500	7.5	24.557	0.01
	POST	15.142				

GRAPH: 2

GRAPHICAL PRESENTATION OF WITHIN GROUP B MUSCLE ENERGY TECHNIQUE ANALYSIS PAIN, ROM AND FUNCTIONAL ACTIVITIES



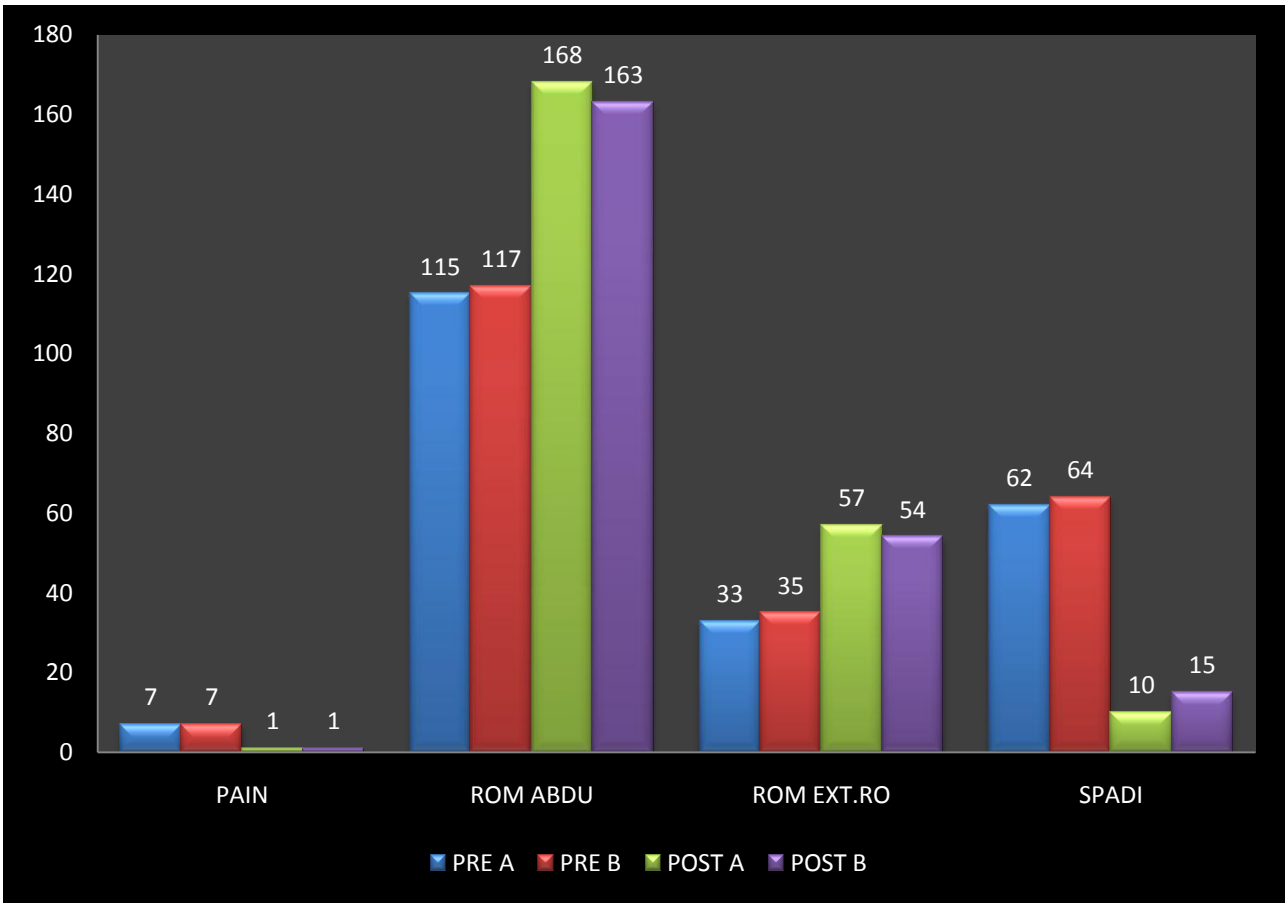
Graphical Representation Muscle Energy Technique (Group B) Within Group Analysis on Pain, Range Of Motion and Functional Activities

TABLE: 9

PRE AND POST TEST VALUES OF MAITLAND MOBILIZATION TECHNIQUE AND MUSCLE ENERGY TECHNIQUE BETWEEN GROUP ANALYSIS

OUTCOMES	ANALYSIS	GROUP	Mean	t value	p value
PAIN	PRE	A	7.428	0.483	0.033
	PRE	B	7.214		
	POST	A	1.357	1.191	0.245
	POST	B	1.785		
ROM ABDUCTION	PRE	A	115	0.296	0.770
	PRE	B	117.5		
	POST	A	168.21	0.986	0.33
	POST	B	163.92		
ROM EXT. ROTATION	PRE	A	33.214	1.091	0.285
	PRE	B	35		
	POST	A	57.50	0.801	0.43
	POST	B	54.285		
Shoulder Pain And Disability Index (SPADI)	PRE	A	62.35	0.489	0.629
	PRE	B	64.642		
	POST	A	10.85	1.293	0.210
	POST	B	15.142		

GRAPH: 3



Graphical Representation on comparison of Maitland Mobilization Technique and Muscle Energy Technique on Pain, Range of Motion and Functional Activities

INTERPRETATION:

The Group A (Maitland Mobilization Technique) for the Pain Pre and Post-test mean value 77.428 and 1.357, ‘t’ value is 5.229 (p< 0.001). Range of Motion-shoulder abduction the Pre and Post-test mean value 115 and 168.21,‘t’ value is 8.850 (p< 0.001).Range of Motion-shoulder external rotation the Pre and Post-test mean value 33.214 and 57.50,‘t’ value 5.375 (P<0 0.001). For SPADI Pre and Post-test mean value 62.35 and 10.85. ‘t’ value is18.666 (P<0 0.001).

The result shows that Maitland Mobilization Technique is an effective technique on reducing pain, improving ROM and functional activities among Adhesive Capsulitis patients.

The Group B Muscle Energy Technique for the Pain Pre and Post-test mean value 7.214 and 1.785, ‘t’ values is 17.542 (p 0.01). Range of Motion- shoulder abduction Pre and Post-test mean value 117.5 and 163.92,‘t’ value is 8.140 (p<0.001). Range of Motion- shoulder external rotation Pre and Post-test mean value 35 and 54.285,‘t’ value is 7.380 (p< 0.01). For SPADI Pre and Post-test mean value 64.642 and 15.142,‘t’ values is 24.577 and (p<0.01)

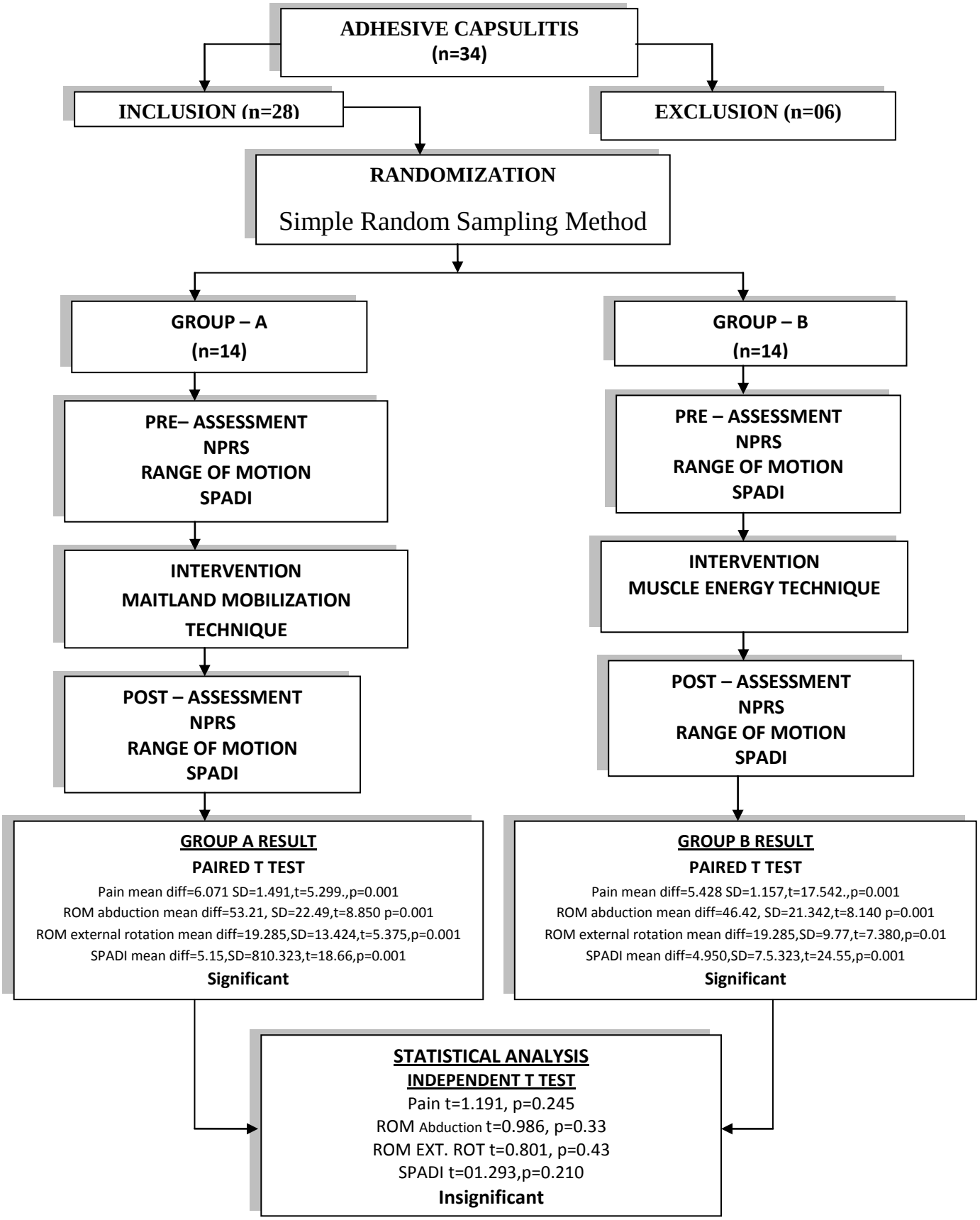
The result shows that Muscle Energy Technique is an effective technique on reducing pain, improving ROM and functional activities among Adhesive Capsulitis patients.

Group A and B Pain Post-test mean value 1.357 and 1.785, the‘t’ value is 1.191(p=0.245). Group A and B Range of motion shoulder abduction post-test mean value 168.21 and 163.92, the ‘t values are0.986 (p=0.33). Group A and B Range of motion shoulder external rotation post-test mean value 57.50 and 54.285 the‘t’ test values is0.801(p=0.43).Group A and B SPADI Post-test mean value 10.85 and 15.142, the‘t’ value is 1.293(p=0.210).

The pre and post test results of Group A and Group B shows that there is a statistical and clinical significant effect of each technique on reducing pain, improving ROM, and functional activities among Adhesive Capsulitis patients.

When both Group A and Group B where compared on between group analysis, the result shows that Maitland Mobilization Technique and Muscle Energy Technique insignificant changes of pain, range of motion and functional activities.

FLOW CHART OF THE STUDY



CHAPTER V

DISCUSSION

Shah Atika Suri.2013 done a study on physical therapy treatment of Adhesive Capsulitis. They concluded that a study analysis of the results of this study showed that both Maitland Mobilization technique and MET are an effective treatment for adhesive capsulitis but Maitland Mobilization is more effective in increasing both active and passive joint ROM, while MET is more effective in reducing pain in patients with adhesive capsulitis. The response from Maitland mobilizations are explained to be different from MET as Maitland mobilization is a passive technique and MET is active technique.

In my study among 28 subjects, 6 were excluded, the remaining 28 subjects age group 40-65years old, and this study was a Quasi-experimental comparative design. Simple random sampling method. 14 subjects were selected in each group of intervention. Maitland Mobilization Technique-Group A and Muscle Energy Technique- Group B are an effective treatment for Adhesive Capsulitis in relieving pain, improving shoulder range of motion abduction and external rotation. But between group analysis Group A Maitland Mobilization Technique and Group B Muscle Energy Technique show ineffective in bring changes in pain and range of motion.

Abhay Kumar. 2012 in their a study analysis of the results of this study showed Maitland Mobilization technique an effective in relieving pain, Improving Range of Motion and shoulder function and hence should form a part of the treatment plan. Significant improvement for all the parameters. This study consisting of 40 subjects in the age groups of 40-60 years old. These were recorded before and after the session of the training. Total duration of the study was four weeks. While analyzing the outcome measures of this study, it was observed that both groups have shown significant. Reduced pain scores, improved significantly in ROM of external rotation, abduction and improvement in SPADI. Results of this study after analysis were directed towards the conclusion that Maitland Mobilization Technique with supervised exercise protocol more effective for treating idiopathic shoulder adhesive capsulitis.

In my study Maitland Mobilization Technique-Group A and Muscle Energy Technique-Group B are an effective treatment for Adhesive Capsulitis in relieving pain, improving shoulder range of motion abduction and external rotation. But between group analysis Group A Maitland Mobilization Technique and Group B Muscle Energy Technique show ineffective in bring changes in pain and range of motion.

Narayan et. al., 2014 conducted an experimental study and found that both groups showed significant difference and improvement after treatment. There is significant difference in post-test scoring both the groups with lower SPADI. MET is very much effective on functional ability of shoulder in Adhesive Capsulitis. The study was consisting of 30 subjects including both male and female age between 40-60 years old. Study duration was 5 weeks. Group A Showed significant change may be due to the application of Muscle Energy Technique that relaxes and improve biomechanics and thus results in improved functional ability. Group B also showed mild changes due to the relaxation effect of conventional treatment. It was evident from the mean score that both groups showed improvement in SPADI score because of the treatments between groups. Analysis relevaled that percentage of improvement in SPADI score was more in shoulder MET group which their showed more improvement than the conventional treatment group.

In my study Maitland Mobilization Technique-Group A and Muscle Energy Technique-Group B are an effective treatment for Adhesive Capsulitis in improving shoulder Pain And Disability Index (SPADI). But between group analysis Group A Maitland Mobilization Technique and Group B Muscle Energy Technique show ineffective in bring changes in Shoulder Pain And Disability Index (SPADI).

It shows that there is a clinical significant improvement of patient's complaints in both groups. But the statistical inference shows that there is no significant difference between both groups. That is both treatments gave equal effectiveness among the outcome measure of Adhesive Capsulitis patients.

CHAPTER VI

SUMMARY AND CONCLUSION

SUMMARY:

The aim of the study was to assess the changes occurring in the musculoskeletal system after Maitland Mobilization Technique and Muscle Energy Technique in Adhesive Capsulitis subjects.

A total number of 34 subjects were selected by Random sampling method after considering the inclusion and exclusion criteria. The informed contents were obtained from subjects individually.

Pain, Range of Motion and Shoulder Pain And Disability Index (SPADI) were taken as the parameters to measure. Pre-test and post-test value of Group A and Group B where obtained and compared by using Paired ‘t’ test and Independent ‘t’ test.

CONCLUSION:

Maitland Mobilization Technique Group A and Muscle Energy Technique Group B both are effective in the treatment of Adhesive Capsulitis. These techniques showed clinical and statistical significant effectiveness on these parameters.

The study is intended to compare the effectiveness between Maitland mobilization Technique and Muscle Energy Technique in the treatment of patient with Adhesive Capsulitis.

The result of the scores shows that is a pain reduction in both groups, improvement of ranges of motion both Shoulder abduction and external rotation. There is an improvement in the functional activities of patients in both groups.

It shows that there is a clinical significant improvement of patient’s complaints in both groups. But the statistical inference shows that there is no significant difference between both groups. That is both treatments gave equal effectiveness among the outcome measure of Adhesive Capsulitis patients.

CHAPTER VII

LIMITATIONS AND RECOMMENDATIONS

- This study was done on subjects with age groups 40-65 years old. Can be planned for in other age group also.
- This study was planned for the PG curriculum, planned for 7 months. The future study can be expanded to under duration and can collect more samples to find out the effectiveness. May be increasing the samples may show the exact effectiveness of each technique in a better way.
- According to the inclusion criteria with in this short duration of 7 months got 28 patients totally. If we extend the study duration we might have more samples
- The prevalence rate was not find in this study. We can also include this along with other demographic descriptive analysis.
- In this study the intervention duration planned was 2 weeks as per the literature reviews. This can be increased to find out the maximum effect.

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ANNEXURE-I

PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee
Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

To
Mr S Parthiban / Mr M Manikandan
I Year MPT
Guides: Mr R Mahesh / Mrs Ashraf Y
PSG College of Physiotherapy
Coimbatore

Ref: Project No.17/126

Date: July 06, 2017

Dear Mr Parthiban / Mr Manikandan,

Institutional Human Ethics Committee, PSG IMS&R reviewed and discussed your application dated 05.04.2017 to conduct the research study entitled "*Comparing the effectiveness of maitland mobilization technique and muscle energy technique on pain, range of motion and functional activities in adhesive capsulitis*" during the IHEC meeting held on 19.05.2017.

The following documents were reviewed and approved:

1. Project submission form
2. Study protocol (Version 1 dated 05.04.2017)
3. Informed consent forms (Version 1 dated 05.04.2017)
4. Data Collection Tool (Version 1 dated 05.04.2017)
5. Permission letter from concerned Head of Department
6. Current CVs of Principal investigator, Co-investigator
7. Budget

The following members of the Institutional Human Ethics Committee (IHEC) were present at the meeting held on 19.05.2017 at IHEC Secretariat, PSG IMS & R between 10.00 am and 11.00 am:

Sl. No.	Name of the Member of IHEC	Qualification	Area of Expertise	Gender	Affiliation to the Institution Yes/No	Present at the meeting Yes/No
1	Mr R Nandakumar (Chairperson, IHEC)	BA., BL	Legal Expert	Male	No	Yes
2	Dr. S. Bhuvaneshwari (Member-Secretary, IHEC)	MD	Clinical Pharmacology	Female	Yes	Yes
3	Dr S Shanthakumari	MD	Pathology, Ethicist	Female	Yes	Yes
4	Dr Sudha Ramalingam	MD	Epidemiologist, Ethicist Alt. member-Secretary	Female	Yes	Yes
5	Dr D Vijaya	M Sc., Ph D	Basic Medical Sciences (Biochemistry)	Female	Yes	Yes

The study is approved in its presented form. The decision was arrived at through consensus. Neither PI nor any of proposed study team members were present during the decision making of the IHEC. The IHEC functions in accordance with the ICH-GCP/ICMR/Schedule Y guidelines. The approval is valid until one year from the date of sanction. You may make a written request for renewal / extension of the validity, along with the submission of status report as decided by the IHEC.

PSG Institute of Medical Sciences & Research
Institutional Human Ethics Committee

Recognized by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER)
POST BOX NO. 1674, PEELAMEDU, COIMBATORE 641 004, TAMIL NADU, INDIA
Phone : 91 422 - 2598822, 2570170, Fax : 91 422 - 2594400, Email : ihec@psgimsr.ac.in

Following points must be noted:

1. IHEC should be informed of the date of initiation of the study
2. Status report of the study should be submitted to the IHEC every 12 months
3. PI and other investigators should co-operate fully with IHEC, who will monitor the trial from time to time
4. At the time of PI's retirement/intention to leave the institute, study responsibility should be transferred to a colleague after obtaining clearance from HOD, Status report, including accounts details should be submitted to IHEC and extramural sponsors
5. In case of any new information or any SAE, which could affect any study, must be informed to IHEC and sponsors. The PI should report SAEs occurred for IHEC approved studies within 7 days of the occurrence of the SAE. If the SAE is 'Death', the IHEC Secretariat will receive the SAE reporting form within 24 hours of the occurrence
6. In the event of any protocol amendments, IHEC must be informed and the amendments should be highlighted in clear terms as follows:
   a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. Clause no. etc.)
   b. Alteration in the budgetary status should be clearly indicated and the revised budget form should be submitted
   c. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Ethics Committee for approval
   d. If the amendment demands a re-look at the toxicity or side effects to patients, the same should be documented
   e. If there are any amendments in the trial design, these must be incorporated in the protocol, and other study documents. These revised documents should be submitted for approval of the IHEC and only then can they be implemented
   f. Any deviation-Violation/waiver in the protocol must be informed to the IHEC within the stipulated period for review
7. Final report along with summary of findings and presentations/publications if any on closure of the study should be submitted to IHEC

Kindly note this approval is subject to ratification in the forthcoming full board review meeting of the IHEC.

Thanking You,

Yours Sincerely,

SECRETARY
PSG IMS&R
COIMBATORE-641004.
INSTITUTIONAL HUMAN ETHICS COMMITTEE

Dr S Bhuvaneshwari
Member - Secretary
Institutional Human Ethics Committee

ANNEXURE-II

ASSESSMENT

Subject Number:

DEMOGRAPHIC DATA:

Name :

Age :

Gender:

Occupation:

Address:

Date of Admission:

Date of Assessment:

IP/OP Number:

Contact number:

SUBJECTIVE ASSESSMENT:

Chief complaints:

Present medical history:

Past medical history:

Personal history:

Family history:

PAIN HISTORY:

Site :

Side :

Onset :

Frequency :

Duration :

Type :

Aggravating factors :

Relieving factors :

NPRS Score :(NUMERICAL PAIN RATING SCALE):

OBJECTIVE ASSESSMENT:

ON OBSERVATION:

Body Built: Ectomorphic /Mesomorphic / Endomorphic

Attitude of Limbs:

Posture:

Muscle Wasting:

Deformity:

Gait:

Tropical Changes:

External Appliances:

ON PALPATION:

Muscle tone:

Tenderness:

Muscle spasm:

Warmth:

Myofascial nodules:

ON MOTOR EXAMINATION:

RANGE OF MOTION: (GONIOMETER)

Movements	Degrees	
	Right	Left
shoulder flexion		
Shoulder extension		
Shoulder abduction		
Shoulder adduction		
Shoulder internal rotation		
Shoulder external rotation		
Elbow flexion		
Elbow extension		
Supination		
Pronation		
Wrist flexion		
Wrist extension		
Ulnar deviation		
Radial deviation		

MUSCLE POWER :(MANUAL MUSCLE TEST)

Movements	Degrees	
	Right	Left
shoulder flexors		
Shoulder extensors		
Shoulder abductors		
Shoulder adductors		
Shoulder internal rotators		
Shoulder external rotators		
Elbow flexors		
Elbow extensors		
Wrist flexors		
Wrist extensors		

MUSCLE GRITH: (INCH TAPE)

AREA	Right(Inches)	Left(Inches)
Arm		
Forearm		

ON SENSATION EXAMINATION:

Superficial sensation:

Deep sensation:

Reflex: (Wexlers grading)

Reflex	Right	Left
Biceps jerk(C5-C6)		
Triceps jerk(C7- C8)		
Brachioradialis jerk (C6- C7)		

SPECIAL TEST:

Apley Scratch / Simple Shoulder Test

- Hand to neck test
- Hand to scapula test
- Hand to opposite scapula test

FUNCTIONAL ASSESSMENT:

SPADI SCALE:

PROVISIONAL DIAGNOSIS:

PHYSIOTHERAPY MANAGEMENT:

OBJECTIVES:

TREATMENT PLAN:

A) Short term goal:

B) Long term goal:

TREATMENT GIVEN:

Date: Therapist's Signature:

FOLLOW UP CHART

Name : Subject Number:

Age : Date of Assessment:

Gender : Data of follow up:

IP/OP Number:

Specific complaints:

RANGE OF MOTION:

Movements	Degrees	
	Right	Left
shoulder flexion		
Shoulder extension		
Shoulder abduction		
Shoulder adduction		
Shoulder internal rotation		
Shoulder external rotation		

TREATMENT PLAN:

Results	Pre-test	Post-test
NPRS	/10	/10
SPADI	/	/
RANGE OF MOTION		
Abduction		
External rotation		

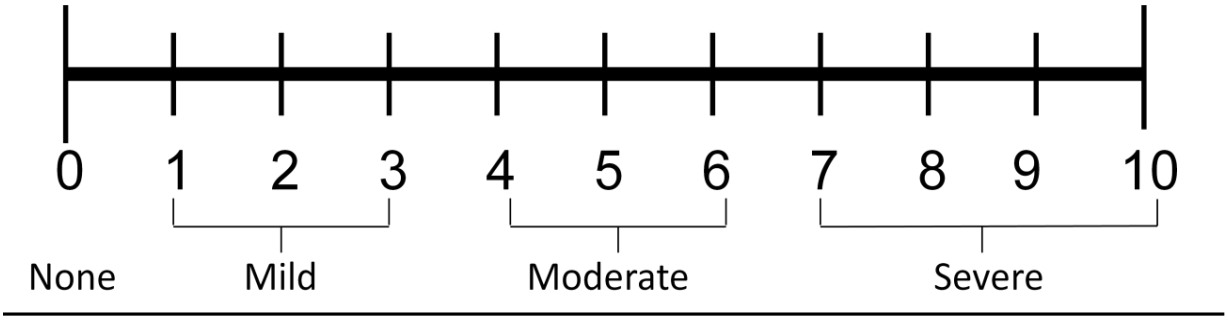
Date: Therapist's Signature:

ANNEXURE-III

The Numeric Pain Rating Scale Instructions

GENERAL INFORMATION:

- The patient is asked to make three pain ratings, corresponding tocurrent, best and worst pain experienced over the past 24 hours.
- The average of the3 ratings was used to represent the patient's level of pain over the previous 24 hours.



ANNEXURE-III

SHOULDER PAIN AND DISABILITY INDEX

Please place a mark on the line that best represents your experience during the last week attributable to your shoulder problem.

PAIN SCALE

How severe is your pain? Circle the number that best describes your pain where: 0 = no pain and 10 = the worst pain imaginable.

Atits worst?	0	1	2	3	4	5	6	7	8	9	10
When lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
Reaching for something onahigh shelf?	0	1	2	3	4	5	6	7	8	9	10
Touching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
Pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

Total pain score/50x100 = % (Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 40)

DISABILITY SCALE

How much difficulty do you have?

Circle the number that best describes your experience where: 0 = no pain and 10 = the worst pain imaginable.

Washing your hair?	0	1	2	3	4	5	6	7	8	9	10
Washing your back?	0	1	2	3	4	5	6	7	8	9	10
Putting on an under shirtor jumper?	0	1	2	3	4	5	6	7	8	9	10
Puttingonashirtthatbuttonsdownthefront	0	1	2	3	4	5	6	7	8	9	10
Putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
Placing an objecton ahigh shelf?	0	1	2	3	4	5	6	7	8	9	10
Carrying a heavy objectof10 pounds(4.5 kilograms)	0	1	2	3	4	5	6	7	8	9	10
Removing something fromyour	0	1	2	3	4	5	6	7	8	9	10

Total disability score/80x100 = % (Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 70)

Total SPADI score/130x100 = %(Note: If a person does not answer all questions divide by the total possible score, eg. if 1 question missed divide by 120)

ANNEXURE-IV

PSG Institute of Medical Science and Research, Coimbatore
Institutional Human Ethics Committee
INFORMED CONSENT FORMAT FOR RESEARCH PROJECTS

We **Parthiban. S** and **Manikandan. M** carrying out a study on the topic: **"Comparing the Effectiveness of Maitland Mobilization Technique and Muscle Energy Technique on Pain, Range of Motion and Functional Activities in Adhesive Capsulitis''** as part of our research project being carried out under the aegis of the Department of Orthopaedics& Physical Medicine and Rehabilitation.

Our research guide is:Mrs. Ashraf. Y, Associate professor, PSG College of Physiotherapy.

The justification for this study is:

Adhesive Capsulitis is a self-limiting condition of unknown etiology characterized by painful and limited active and passive glenohumeral range of motion. Maitland Mobilization technique and Muscle Energy Technique combined with glenohumeral exercise can relieve the pain, improves range of motion and functional activities.

The objectives of this study:

1. To determine the effects of Maitland Mobilization Technique (MMT) on pain, range of motion and functional activities in subjects with adhesive capsulitis.

2. To determine the effects of Muscle Energy Technique (MET) on pain, range of motion and functional activities in subjects with adhesive capsulitis.

3. To compare the effects of Maitland Mobilization Technique and Muscle Energy Technique on pain, range of motion and functional activities in subjects with adhesive capsulitis.

Sample size: **30**

Study participants are **Adhesive Capsulitis** subjects, age group of **40-65years.**

Location: Department of Orthopaedics and Department of Physical Medicine and Rehabilitation, PSG Hospitals, Coimbatore.

We request you to kindly cooperate with us in this study. We propose to collect the background information and other relevant details related to this study. We will be carrying out:

Initial interview: 45-60 minutes.

Final interview: 45-60 minutes.

If **Photograph** taken, purpose: **yes,** without revealing the identity of yours we want to publish it in the project book, conferences and journals.

Data collected will be stored for a period of **2 years.We will not use** the data as part of another study.

Health education sessions: **Two** sessionseach **45** minutes.

Clinical examination (specify details purpose): **Yes**

Blood sample collection: Not Applicable.

Specify quantity of blood being drawn**:** ml.

No. of times it will be collected: **NA**

Whether blood sample collection is part of routine procedure or for research (study) purpose: **NA**

1. Routine procedure 2. Research purpose

Specify purpose, discomfort likely to be felt and side effects, if any: **NA**
Whether blood sample collected will be stored after study period: Yes / No, it will be destroyed **/ NA**
Whether blood sample collected will be sold: Yes/ No **/ NA**
Whether blood sample collected will be shared with persons from another institution: Yes/ No / **NA**
Medication given, if any, duration, side effects, purpose, benefits: **NA**
Whether medication given is part of routine procedure: Yes / No / **NA** (If not, state reasons for giving this medication)
Whether alternatives are available for medication given: Yes / No / **NA** (If not, state reasons for giving this particular medication)
Benefits from this study:

- Pain will be reduced.
- Range of motion will be improved.
- Shoulder Functional activities will be improved.

Risks involved by participating in this study: There are minimal risks or discomforts will be experienced during this study. The discomforts are stretch pain and exercise induced pain that will be reduced by applying hot pack
How the **results** will be used:
The data collected during the study will be used without revealing your identity. Your identity will be confidential even if the results of the study are published in Peer-reviewed scientific journals, Conference presentation and internal report.
If you are uncomfortable in answering any of our questions during the course of the interview, **you have the right to withdraw from the interview / study at anytime.** You have the freedom to withdraw from the study at any point of time. Kindly be assured that your refusal to participate or withdrawal at any stage, if you so decide, will not result in any form of compromise or discrimination in the services offered nor would it attract any penalty. You will continue to have access to the regular services offered to a patient. You will **NOT** be paid any remuneration for the time you spend with us for this interview / study. The information provided by you will be kept in strict confidence. Under no circumstances shall we reveal the identity of the respondent or their families to anyone. The information that we collect shall be used for approved research purposes only. You will be informed about any significant new findings - including adverse events, if any, – whether directly related to you or to other participants of this study, developed during the course of this research which may relate to your willingness to continue participation.
Consent: The above information regarding the study, has been read by me/ read to me, and has been explained to me by the investigator/s. Having understood the same, I hereby give my consent to them to interview me. I am affixing my signature / left thumb impression to indicate my consent and willingness to participate in this study (i.e., willingly abide by the project requirements).

Signature / Left thumb impression of the Study Volunteer / Legal Representative:

Signature of the Interviewer with date: Witness:
Contact number of PI: 9442205920
Contact number of Ethics Committee Office: 0422 4345818

ANNEXURE-VI

TREATMENT PROTOCOL

GROUP A (Maitland Mobilization Technique)

POSITION:

- Position of patient: lying position
- Examiner position: walk standing position

TECHNIQUE:

- POSTERIO-ANTERIOR GLIDING
- CAUDAL GLIDE

GRADING:

- Grading: Grade- III & IV

<u>POSTERIO-ANTERIOR GLIDING:</u>

- Mobilization technique to improve shoulder external rotation

POSITION PATIENT:

- Prone with the arm supported over thigh the acromion stabilized with padding.

PROCEDURE:

Forward stride position, the participants arm supported against thigh and outside hand. This position provides grading distraction, the ulnar border of the other hand placed just distal to the posterior angle of the acromion process. This proximal hand provides the mobilizing force posterior –anterior for gliding.

(A).Glenohumeral joint PA glide

CAUDAL GLIDING :

- Mobilization technique to improve shoulder abduction

POSITION PATIENT:

- Supine position forearm supported between trunk and elbow of examiner

PROCEDURE:

One hand placed in the patient axilla to provide the grading distraction and other hand is placed over the lower arm to provide caudal glide.

(**B). Caudal glide**

DURATION:

- Passive oscillatory movements performed at the rate of 2 set 10 repetitions
- The technique will be applied 6 sessions/ week/ 2weeks

GROUP B (Muscle Energy Technique)

POSITION:

- Position of patient: Supine position
- Examiner position: walk standing position

TECHNIQUE:

- **POST-ISOMETRIC RELAXATION**

- GlenohumeralJoint horizontal abduction
- Glenohumeral Joint External rotation

<u>Glenohumeral Joint Horizontal Abduction:</u>

- Technique to improve Glenohumeral Joint abduction

PROCEDURE:

The examiner stabilized the scapula at the lateral border with the elbow flexed, the participant shoulder will be horizontally adducted to the first barrier of motion. Against an opposing force provided by the examiner at the distal humerus. Isometric contraction performed 5 seconds.

A). GH Joint horizontal abduction

Glenohumeral Joint External Rotation

- Technique to improve Glenohumeral Joint external rotation

PROCEDURE:

- Patient in supine position with arm supported and the participant shoulder and elbow in 90^0 of abduction and flexion.
- Examiner passively moved the arm into internal rotation until the first barrier of motion will be reached. Against an opposing force provided by the examiner at the distal forearm.
- Isometric contraction performed 5 seconds.

(**B). GH Joint External rotation**

DURATION:

- Movements performed at the rate of 2 set 6repetitions
- The technique will be applied 6 sessions/ week/ 2weeks

ANNEXURE-VI

ADHESIVE CAPSULITIS TREATMENT PROTOCOL

(HOME EXERCIS)

PATIENT NAME: ..... AGE: …… OP/IP NO: ……..

A.WAND EXERCISES:

- Position of patient: standing position
- Be certain to start with very light stick or body bar
- Duration:10- 20 repetitions / 2 sessions / day

1. **FLEXION EXERCISE:**

   Holing a stickwith both hands and lifting the hand up assisting the normal hand with affected hand until the limit of pain hold it for 10 seconds and lower it down.

2. **EXTENSION EXERCISE:**

   Holing a stick and lifting the hand back of region assisting the normal hand with affected hand until the limit of pain hold it for 10 seconds and lower it down.

3. **ABDUCTION AND ADDUCTION EXERCISE:**

   Holing a stick and lifting the hand side to the body assisting the normal hand with affected hand until the limit of pain hold it for 10 seconds and lower it down.

4. **EXTERNAL ROTATION EXERCIS:**

   Lying position- Holing a stick with both hands push the affected hand with the normal hand side way until the limit of pain hold it for 10 seconds and lower it down.

5.INTERNAL ROTATION EXERCISE:

Holing a stick behind your back with the affected hand holding down and normal up pull the normal hand upwards and downwards.

B.PENDULAR EXERCISES:

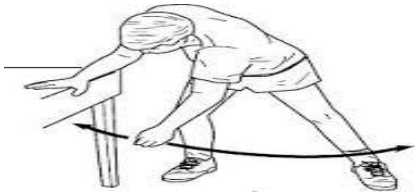
- Position of patient: standing position- lean on a table holding normal hand and affected side arm hanging downward position.
- Duration - 10- 20 repetitions / 2 sessions / day.

1. **FLEXION&EXTENSION EXERCISE:**

   Affected side arm should be relaxed and swing the hand freely forwards and backwards.

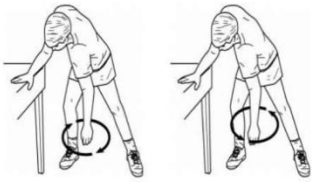
2. **ABDUCTION &ADDUCTION EXERCISE:**

   Affected side arm should be relaxed and swing the hand freely side to side.



3. **ROTATION EXERCISE:**

   Affected side arm should be relaxed swing the hand circular rotation clockwise and anti clockwise



C.WALL CLIMBING EXERCISES:

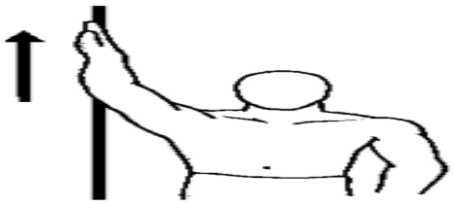
- Position of patient: standing position with wall support
- Duration - 10- 20 repetitions / 2 sessions / day.

1. **FLEXION EXERCISE:**

   Stand in front of a wall with affected hand climb on your finger until the pain range hold the stretch for 15to 20 seconds and bring it down, progress every day gradually.

2. ABDUCTION EXERCISE:

Stand in side of a wall with affected hand climb on your finger until the pain range hold the stretch for 15to 20 seconds and bring it down, progress every day gradually.

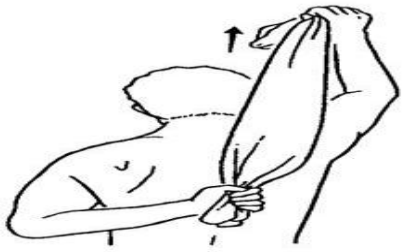


D.STRETCHING:

- Position of patient: standing position or sitting position
- Duration- 5 repetitions / 2 sessions / day.

1. TOWEL STRETCH:

Hold the towel with both hands behind your back with the affected side hand holding down and normal hand up. Pull the towel and upward direction. Hold the 15 to 20 seconds.



Date.....

2. PECTORALIS STRETCH:

Stand at a corner of a wall with the arm against the wall, move the chest forward until you tell a gentle stretch, hold for 10 seconds and relax.

3. BICEPS STRETCH:

Stand in front of a wall with affected hand hold them. Slowly turn to the opposite side gentle stretch your hand.

……

Therapist Signature

ABSTRACT

BACKGROUND: Adhesive capsulitis is a self-limiting condition of unknown etiology characterized by painful limited active and passive glenohumeral range of motion of > 25% in at least two directions most notably shoulder abduction and external rotation. Adhesive capsulitis, commonly referred to as frozen shoulder, is associated with synovitis and capsular pattern of the shoulder joint and can be classified either primary or secondary. Adhesive Capsulitis is often more prevalent in women, individual's 40-65years old, and in the diabetic population. Patients frequently have difficulty with performing overhead functional activities.

OBJECTIVE: To compare the effects of Maitland Mobilization Technique and Muscle Energy Technique on pain, range of motion and functional activities in subjects with Adhesive Capsulitis.

METHOD AND SUBJECTS: Among 34 subjects, 6 were excluded, the remaining 28 subjects age group 40-65years old, were retruited this study was a Quasi-experimental comparative design this was conducted at department of Orthopaedics & Department of Physical Medicine and Rehabilitation, PSG Hospitals, Coimbatore. By simple random sampling method. 14 subjects were selected in each group of intervention. Group A Maitland Mobilization Technique and Group B Muscle Energy Technique. Both the groups were treated 3 session / week for 2 weeks. All the subjects were measured for pain by NPRS, for all shoulder ROM by goniometer and functional activities by SPADI. Post-test assessment was done on 14^{th} day. Data were analyzed by SPSS-20 to determine the effects of both the treatment regimens and compared with each other.

RESULTS: Data analysis revealed that within group statistically significant difference within group Group A Maitland Mobilization Technique and Group B Muscle Energy Technique both groups showed significant ($p<0.001$) improvement for all parameters. The Group A (Maitland Mobilization Technique) for the Pain Pre and Post-test mean value 77.428 and 1.357, 't' value is 5.229 ($p< 0.001$).Range of Motion-shoulder abduction he Pre and Post-test mean value 115 and 168.21,'t' value is 8.850 ($p< 0.001$). Range of Motion-shoulder external rotation the Pre and Post-test mean value 33.214 and 57.50, 't' value 5.375 (P<0 0.001). For SPADI Pre and Post-test mean value 62.35 and 10.85. 't' value is18.666 (P<0 0.001).The Group B Muscle Energy Technique for the Pain Pre and Post-test mean value 7.214 and 1.785, 't'values is 17.542(p 0.01). Range of Motion- shoulder abduction Pre and Post-test mean value 117.5 and 163.92, 't'value is 8.140($p<0.001$). Range of Motion- shoulder external rotation Pre and Post-test mean value 35 and 54.285,'t' value is 7.380($p< 0.01$). For SPADI Pre and Post-test mean value 64.642 and 15.142,'t' values is 24.577 and ($p<0.01$).But the between group analysis, it showed insignificant changes ($p>0.05$) for all parameters. Group A and B Pain Post-test mean value 1.357 and 1.785, the 't' value is 1.191($p=0.245$). Group A and B Range of motion shoulder abduction post-test mean value 168.21 and 163.92, the't' values are 0.986($p=0.33$). Group A and B Range of motion shoulder external rotation post-test mean value 57.50 and 54.285 the't' test values is0.801($p=0.43$). Group A and B SPADI Post-test mean value 10.85 and 15.142, the't' value is 1.293($p=0.210$).

CONCLUSION: The study confirmed that addition of the Group A Maitland Mobilization Technique and Group B Muscle Energy Technique have proved their efficacy in relieving pain, improving ROM and improving functional activities. But comparing both groups was insignificantly changes over the pain, Range of Motion and functional activities.

KEY WORDS: Adhesive Capsulitis, Maitland Mobilization Technique, Muscle Energy Technique, Numerical Pain Rating Scale, Range of Motion, Shoulder Pain And Disability Index.